SCIENCE
CURRICULUM MAP

Our subject vision:

Aspiration	**Mission statement:** *'We aim to teach students to become scientifically literate and responsible citizens as well as our next generation of inspirational professional scientists. A solid understanding of science is imperative for everyone and we have an aspirational curriculum full of great opportunities for every student.* *As a faculty "we enable all students to **acquire knowledge** that takes them beyond their experience. Access to knowledge is the **right** of all pupils as future citizens'* (Young, 2014). **Knowledge:** In Science we aim to understand the world around us. We look at everything from tiny atoms to enormous stars as well as how our bodies work. We have a spiral curriculum so key ideas are revisited and built-upon such as cells, energy and atomic structure. **Skills:** Students learn how to plan experiments, use laboratory equipment, analyse data and draw valid conclusions. We encourage a deep level of analytical thinking around topical scientific issues and believe that all students should learn to think like scientists. **Understanding:** At the end of students' study of Science they will be able to understand the world around them to be able to make decisions for themselves and their families. They will be prepared to undertake further study and have developed a curiosity for how and why things work.
Opportunity	**Within the classroom:** In Science lessons, students study a range of topics along with developing their practical skills. We ensure that every topic begins with links to relevant careers for students to explore using a research-based homework. Each topic also contains a link to a relevant real-life scientist. We offer "extra-curricular" within our curriculum such as a project tracking local wildlife, sponsored by the Royal Society. **Beyond the classroom:** Beyond the curriculum, students may participate in: • Science club • Eco club • IRIS Research project • Lots of partnership activities as part of the Abingdon Science partnership • External talks and visits
Integrity	**Knowledge:** Scientific knowledge allows students to engage with the world around them, to be active and knowledgeable citizens. Students are taught key information to help them make life choices such as around reproduction, genetic engineering and climate change. **Skills:** Students often work in pairs or small groups to complete practical work. This allows them to develop team working skills such as negotiation and clear communication. They are encouraged to have a solution-focused approach to problems that arise during the practical. **Understanding:** They demonstrate their character development through their increasing ability to apply real-world knowledge to their work, and through their application of empathy and interpretation skills in discussion and in writing.

SUBJECT CURRICULUM MAP
KS4: BIOLOGY (TRIPLE)
AQA GCSE Biology (8461)

Further study

- A-level in Biology, PE and psychology
- Apprenticeships

Career pathways

- Biology teacher
- Medicine
- Marine biologist
- Ecologist
- Technician

Year 11

Biodiversity and Impacts

- Human population explosion
- Land, Air and Water pollution
- Human effects on the environment
- Maintaining biodiversity
- Global warming

Triple only:

- *Factors affecting food security*
- *Sustainable and efficient food production*
- *Fisheries and biotechnology*

Summer exams

Variation and Evolution

- Adaptation and completition
- Variation
- Evolution by natural selection
- Evidence for evolution
- Fossils and extinction
- Selective breeding
- Genetic Engineering and ethics
- Classification

Triple only:

- *Theories of evolution*
- *History of genetics*
- *Cloning*
- *Adult cell cloning*

Throughout KS4 students have end of unit assessments and then larger assessments to allow them to revisit earlier topics.

Ecosystems & Cycling

- Abiotic and Biotic Factors
- Carbon cycle
- Water cycle
- Feeding relationships (food chains, predator/prey)
- Field investigations required practical

Triple only:

- *Trophic levels and biomass*
- *Decomposers*
- *Rates of decomposition*
- *Decay Required Practical*

Hormonal Control

- Hormones
- Blood glucose and diabetes
- Human reproduction
- Contraception and Fertility

Triple only:

- Plant hormones
- Plant responses required practical
- Water balance and the kidney

Reproduction

- A-sexual and sexual reproduction
- Meiosis
- DNA and the genome
- Inherited disorders and genetics
- Genetic screening

Triple only:

- *DNA structure*
- *Protein Synthesis*
- *Gene expression and mutation*

Mock exams

The Nervous System

- Neurones
- Reaction Time Required Practical
- Reflex response

Triple only:

- *The brain*
- *The eye*
- *Controlling temperature*

Mock exams

Mock exams are a complete paper 1 (topics 1-4)

Extra opportunities
Practical science workshops
Careers fairs and workshops

Bioenergetics

- Photosynthesis
- Rate of photosynthesis
- How plants use glucose
- Photosynthesis Required Practical
- Aerobic and anaerobic respiration
- Responding to exercise
- Metabolism and the liver

Triple only:

- *Greenhouse economics*
- *Inverse square law*

Preventing and treating diseases

- Primary and secondary defence mechanisms in humans
- Vaccination
- Antibiotics and painkillers
- Discovering and developing drugs

Triple only:

- *Making and using monoclonal antibodies*
- *Growing bacteria in the lab and preventing bacterial growth*
- *Culturing Microorganisms Required Practical*

Communicable & Non-communicable Disease

- Health and Disease
- Pathogens
- Diseases caused by fungi, bacteria, viruses and protists
- Non-communicable disease
- Cancer
- Lifestyle risks for disease (smoking, diet, exercise, alcohol and carcinogens)

Triple only:

- *Plant diseases*
- *Plant defence*

Year 10

Year 11

1 Hormonal Control

Why this?	This topic explores how humans respond to their surroundings, focusing on diabetes, reproduction and water balance. It helps students to understand their bodies and the world around them.
Why now?	This topic builds on students understanding of homeostasis that they considered in year 10 as well as organ systems which was taught in year 9.

2 Reproduction

Why this?	This looks at the different types of reproduction, as well as the structure of DNA, protein synthesis, gene mutation and inheritance.
Why now?	This topic brings together many earlier topics considered in year 9 and 10 Biology. Providing the basis for adaptation in animals and plants and how all proteins in the body are synthesised.

3 Variation and Evolution

Why this?	In this topic students will study how our understanding of evolution has changed, considering the work of Lamarck, Wallace and Darwin. Students will consider evidence for the process of natural selection. Finally students will consider selective breeding, genetic engineering and cloning – all process that rely on our knowledge of DNA and natural selection.
Why now?	This topic builds on key topics, such as DNA and inheritance , which was studied in reproduction.

4 Biodiversity and Impacts

Why this?	This topic looks at the effects of the human population explosion. This is important to allow us to understand how we can reduce our carbon footprint and support biodiversity. As well as considering how food security will be maintained in the future.
Why now?	This topic consolidates how our knowledge of evolution impacts on ecosystems and allows us to think about how we can reduce the waste we emit, support our ecosystems and ensure food security for the future.

Year 10

1 Communicable & Non-Communicable Disease

Why this?	In this topic pupils will be introduced to a range of pathogens which cause infectious diseases. As well as how lifestyle risk factors can affect our health and non-communicable disease. This is a very exciting topic, which allows pupils to apply their knowledge to real life situations.
Why now?	This topic builds on pupils' knowledge of eukaryotic and prokaryotic cell structure from year 9, as well as how pathogens cause disease.

2 Preventing and Treating Disease

Why this?	This topic explores how the body defends itself against pathogens, the importance of vaccination and antibiotics. It also considers how we can treat infectious diseases and how we develop drugs prior to their use on patients.
Why now?	This topic builds on their knowledge of disease and extends pupils learning by exploring how we can treat infectious diseases. As well as the science behind developing a vaccine and drug.

3 Bioenergetics

Why this?	This topic considers two fundamental reations in Biology – photosynthesis and respiration. These two reactions form foundational knowledge for students understanding of living things and their survival.
Why now?	This topic builds on students' knowledge of cell structure and enzymes learnt in year 9.

4 The Nervous System

Why this?	This topics explores humans respond to their surroundings and coordinate their responses. It looks at the central nervous system. Students will focus on the control of body temperature as an example of this in action.
Why now?	This topic builds on knowledge learnt in year 9 looking at specialised cells. It looks at how we coordinate our responses.

5 Ecosystems and Cycling

Why this?	Students begin to look at ecosystems and how many of the nutrients discussed in both year 9 and 10 are cycled throughout organisms and ecosystems.
Why now?	This topic allows us to build on how ecosystems are impacted by both abiotic and biotic influences. It then gives us a greater understanding of how materials are recycled and why this is important. Knowledge from the bioenergetics is needed to access this topic.

SUBJECT CURRICULUM MAP
KS4: BIOLOGY (COMBINED)
AQA GCSE Combined Science: Trilogy (8464)

Further study

- A-level in Biology, PE and psychology
- Apprenticeships

Career pathways

- Biology teacher
- Medicine
- Marine biologist
- Ecologist
- Technician

Year 11

Revision

Revision of GCSE Biology content from years 9 – 11.
Cover the following topics

1. Cell Structure and Transport
2. Organisation
3. Infection and Response
4. Bioenergetics
5. Homeostasis and Response
6. Reproduction
7. Ecology

Summer exams

Mock exams

Variation and Evolution

- Adaptation and competition
- Variation
- Evolution by natural selection
- Evidence for evolution
- Fossils and extinction
- Selective breeding
- Genetic Engineering and ethics
- Classification

Throughout KS4 students have end of unit assessments and then larger assessments to allow them to revisit earlier topics.

Ecology

- Abiotic and Biotic Factors
- Carbon cycle
- Water cycle
- Feeding relationships (food chains, predator/prey)
- Field investigations required practical
- Human population explosion
- Land, Air and Water pollution
- Human effects on the environment
- Maintaining biodiversity
- Global warming

Hormonal Control

- Hormones
- Blood glucose and diabetes
- Human reproduction
- Contraception and Fertility

Reproduction

- A-sexual and sexual reproduction
- Meiosis
- DNA and the genome
- Inherited disorders and genetics
- Genetic screening

The Nervous System

- Neurones
- Reaction Time Required Practical
- Reflex response

Mock exams

Mock exams are a complete paper 1 (topics 1-4)

Extra opportunities
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Bioenergetics

- Photosynthesis
- Rate of photosynthesis
- How plants use glucose
- Photosynthesis Required Practical
- Aerobic and anaerobic respiration
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- Metabolism and the liver

Preventing and treating diseases

- Primary and secondary defence mechanisms in humans
- Vaccination
- Antibiotics and painkillers
- Discovering and developing drugs

Communicable & Non-communicable Disease

- Health and Disease
- Pathogens
- Diseases caused by fungi, bacteria, viruses and protists
- Non-communicable disease
- Cancer
- Lifestyle risks for disease (smoking, diet, exercise, alcohol and carcinogens)

Year 10

Year 11

1 Reproduction

Why this?	This topic consider both asexual and sexual reproduction in animals and plants. Students will gain a greater understanding of DNA and it's role in inheritance.
Why now?	This topic explores how organisms allow their genes to be passed onto offspring. It also explores genetic disorders and how we can screen for these. It builds on knowledge learnt in both year 9 and 10 biology on ecosystems, mitosis and meiosis.

2 Variation and Evolution

Why this?	This topic looks at Charles Darwin's theory of natural selection and how this led to evolution. Students will consider evidence for the process of natural selection found in fossils. Finally, students will consider selective breeding, and genetic engineering–process that rely on our knowledge of DNA and natural selection.
Why now?	This topic builds on key topics, such as DNA, which was studied in reproduction as well as understanding of adaptations covered in year 10 ecology.

3 Revision

Why this?	Having encountered the full biology section of the course, students practise exam technique and revise for the final few weeks before exams.
Why now?	All units have been covered: this part of the course will interleave knowledge and exam skills responsively to student need.

Year 10

1 Communicable & Non Communicable Disease

Why this?	In this topic pupils will be introduced to a range of pathogens which cause infectious diseases. As well as how lifestyle risk factors can affect our health and non-communicable disease. This is a very exciting topic, which allows pupils to apply their knowledge to real life situations.
Why now?	This topic builds on pupils' knowledge of eukaryotic and prokaryotic cell structure from year 9, as well as how pathogens cause disease.

2 Preventing and Treating Disease

Why this?	This topic explores how the body defends itself against pathogens, the importance of vaccination and antibiotics. It also considers how we can treat infectious diseases and how we develop drugs prior to their use on patients.
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Why this?	This topics explores humans respond to their surroundings and coordinate their responses. It looks at the central nervous system.
Why now?	This topic builds on knowledge learnt in year 9 looking at specialised cells. It looks at how we coordinate our responses.

5 Ecology

Why this?	Students begin to look at ecosystems and how many of the nutrients discussed in both year 9 and 10 are cycled throughout organisms and ecosystems. They will consider the impact of the human population explosion. This is important to allow us to understand how we can reduce our carbon footprint and support biodiversity.
Why now?	This topic allows us to build on how ecosystems are impacted by both abiotic and biotic influences. It then gives us a greater understanding of how materials are recycled and why this is important. Knowledge from the bioenergetics is needed to access this topic.

6 Hormonal Control

Why this?	This topic explores how humans respond to their surroundings, focusing in particular on diabetes and reproduction. It helps students to understand their bodies and the world around them.
Why now?	This topic builds on students understanding of homeostasis taught in the nervous system as well as organ systems in year 9.